

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
1 July 2004 (01.07.2004)

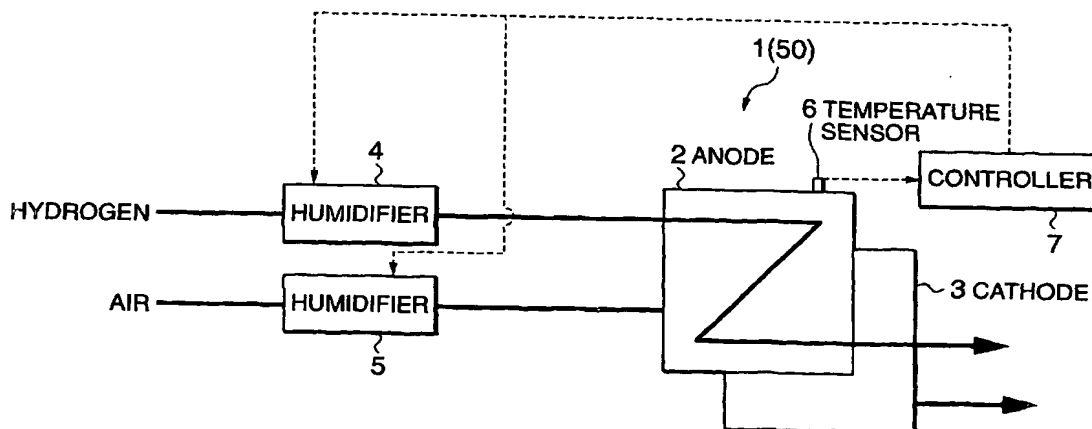
PCT

(10) International Publication Number
WO 2004/055928 A3

- (51) International Patent Classification⁷: H01M 8/04 (74) Agent: GOTO, Masaki; Shoyu-Kaikan, 3-1, Kasumi-gaseki 3-chome, Chiyoda-ku, Tokyo 100-0013 (JP).
- (21) International Application Number: PCT/JP2003/015324 (81) Designated States (*national*): CN, KR, US.
- (22) International Filing Date: 1 December 2003 (01.12.2003) (84) Designated States (*regional*): European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR).
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2002-366743 18 December 2002 (18.12.2002) JP
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- Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report:
24 March 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FUEL CELL SYSTEM



(57) Abstract: Each of fuel cells (1) comprises an electrolyte membrane (10) which is held between an anode (2) and a cathode (3), and is caused to perform power generation by supplying hydrogen to the anode (2) from a hydrogen passage (11) and supplying air to the cathode (3) from an air passage (12). After the fuel cells (1) stop generating power, hydrogen which has been appropriately humidified on the basis of the temperature of the fuel cells (1) is supplied to the anode (2), and air which has been appropriately humidified on the basis of the temperature of the fuel cells (1) is supplied to the cathode (3). By means of this processing, condensed water inside the fuel cells (1) can be removed without causing the electrolyte membrane (10) to dry out, and hence the fuel cells (1) can be restarted easily in low temperatures.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01M8/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, Y	US 6 635 374 B1 (NISSAN MOTOR CO., LTD.) 21 October 2003 (2003-10-21) Col. 1, lines 31-62; Col. 2, lines 46-60; Col. 3, lines 1-6; Col. 5, line 41 - Col. 6, line 26; Fig. 1-3; Claims 1 & 10	1-15
P, Y	US 2002/192520 A1 (TOYOTA JIDOSHA K.K.) 19 December 2002 (2002-12-19) P. 1, paragraphs '0007!-'0009!; Fig. 1-7; Claims 1, 16, 19 & 21	1-15
Y	US 6 376 111 B1 (GENERAL MOTORS CORP.) 23 April 2002 (2002-04-23) Col. 1, lines 47-62; Col. 2, lines 54-64; Col. 3, lines 35-41; Col. 4, lines 1-18 & 45-50; Fig. 1 & 2; Claims 1, 7 & 13 -/--	1-15

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

21 January 2005

Date of mailing of the international search report

31/01/2005

Name and mailing address of the ISA

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 01/91216 A (NISSAN MOTOR CO., LTD.) 29 November 2001 (2001-11-29) P. 2, line 6 - P. 3, line 29; P. 7, lines 10-21; Fig. 1-5; Claims 1, 9 & 10	1-15
A	US 2001/010875 A1 (HONDA GIKEN KOGYO K.K.) 2 August 2001 (2001-08-02) P. 1, paragraphs '0013!-'0014!; Fig. 1-6; Claims 1, 8 & 10	1-15
A	WO 00/42671 A (ENERGY PARTNERS L.C.) 20 July 2000 (2000-07-20) P. 2, lines 1-16; P. 4, lines 2-23; Fig. 1; Claims 1, 6 & 7	1-15
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 09, 13 October 2000 (2000-10-13) & JP 2000 164231 A (TOSHIBA CORP.), 16 June 2000 (2000-06-16) abstract	1-15
A	PATENT ABSTRACTS OF JAPAN vol. 009, no. 118 (E-316), 23 May 1985 (1985-05-23) & JP 60 007068 A (TOSHIBA CORP.), 14 January 1985 (1985-01-14) abstract	1-15
A	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 11, 6 November 2002 (2002-11-06) & JP 2002 208421 A (DENSO CORP.), 26 July 2002 (2002-07-26) cited in the application abstract	1-15

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6635374	B1	21-10-2003	JP	2000315509 A	14-11-2000
			DE	10021946 A1	12-07-2001
US 2002192520	A1	19-12-2002	JP	2000243418 A	08-09-2000
			DE	10007973 A1	21-09-2000
			US	6524733 B1	25-02-2003
US 6376111	B1	23-04-2002	CA	2326247 A1	25-07-2001
			DE	10065460 A1	16-08-2001
WO 0191216	A	29-11-2001	JP	2001332280 A	30-11-2001
			CN	1394367 T	29-01-2003
			EP	1287574 A2	05-03-2003
			WO	0191216 A2	29-11-2001
			US	2002106537 A1	08-08-2002
US 2001010875	A1	02-08-2001	JP	2001216984 A	10-08-2001
			JP	2001216985 A	10-08-2001
WO 0042671	A	20-07-2000	AU	2610100 A	01-08-2000
			CA	2360389 A1	20-07-2000
			CN	1340221 T	13-03-2002
			EP	1166379 A1	02-01-2002
			JP	2002535806 T	22-10-2002
			WO	0042671 A1	20-07-2000
			US	2003031902 A1	13-02-2003
JP 2000164231	A	16-06-2000	NONE		
JP 60007068	A	14-01-1985	NONE		
JP 2002208421	A	26-07-2002	NONE		